Selective Vagotomy plus Suprapyloric Antrectomy with and without Pylorotomy for Duodenal Ulcer

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SELECTIVE VAGOTOMY plus suprapyloric antrectomy evolved from experimental studies aimed at devising a technically feasible operation for controlling the diathesis of duodenal ulcer without producing the dumping syndrome. Criteria of study were: 1) sufficient reduction of acid secretion, 2) preservation of the pylorus and its function, and 3) preservation of enough stomach to serve as an adequate gastric reservoir.

Selective vagotomy without complementary drainage was initially tested but proved unsatisfactory because of gastric stasis.[6,12] Further study with selective vagotomy of the parietal cell mass resulted in nearly normal gastric emptying without stasis, but Heidenhain pouch secretion increased twofold.[1,6] To prevent this increased secretion, suprapyloric antrectomy[11] was added to selective vagotomy; the results were partial preservation of normal rhythmic gastric emptying, no stasis, and decreased Heidenhain pouch secretion.[1,3] Subsequent total or truncal vagotomy increased the pouch secretion.[8]

Results of selective vagotomy plus suprapyloric antrectomy best satisfied the experimental criteria. Consequently, this procedure was applied to patients with duodenal ulcer. In this report are presented the preliminary results.

Material and Methods

During a 16-month period in 1968 and 1969, 20 patients underwent selective vagotomy plus suprapyloric antrectomy (Group 1). During the subsequent 19 months extending from 1969 into 1971, an additional 20 patients underwent selective vagotomy plus suprapyloric antrectomy with pylorotomy (Group 2). In all 40 patients the preoperative diagnosis of intractable duodenal ulcer was confirmed at elective operation by the finding of an active ulcer or the scar of healed ulcer. Patients with exigent hemorrhage, perforation, and obstruction were excluded from study.

Operative Technique

Selective vagotomy was performed as previously described.[4] All gastric vagi were transected, and all hepatic and celiac vagi were preserved.

The gastric outlet was calibrated by palpation with a finger inserted via a small gastrotomy and passed through the pylorus into the duodenum. When the caliber of the gastric outlet was deemed adequate by this method, suprapyloric antrectomy was performed. The stomach was transected distally a measured 1.5 cm proximal to the pylorus, and proximally at the antral-corpus border as determined by an intragastric spray of Congo Red.[1] The gastric remnant was closed along the lesser curve and then anastomosed end-to-end to the distal antral cuff.

Pylorotomy was performed prior to suprapyloric antrectomy in Group 2. The incision for pylorotomy entailed a full-thickness longitudinal transection of the anterior pyloric ring. All layers, including the mucosa, were transected to eliminate any stenosis from submucosal fibrosis coexistent or secondary to the duodenal ulcer. This incision confined to the pylorus was always less than 1 cm in length, and was closed transversely with three or four interrupted sutures. The result was a slightly more patulous pylorus which, when palpated from within, still imparted the sensation of a valvular ring.

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Secretory Studies

Pre- and early post-operative analyses of basal secretions were done in all patients as previously described.[5] Late basal and histamine stimulated secretions and insulin tests have not been obtained.

Radiologic Studies

Upper gastrointestinal series were done in all patients during the fourth postoperative month. The barium was in a liquid medium customarily used for diagnostic purposes. Gastric emptying of solid food was not evaluated.

Meals Provocative of the Dumping Syndrome

Upon discharge from the hospital on or about the seventh postoperative day, no dietary restrictions were imposed and no symptoms of dumping were discussed. During the first three postoperative months patients were given provocative foods of high sugar content in liquid form (e.g., sweetened fruit juices, milk shakes, sugar coated pastries, and liberal servings of syrup and honey on hotcakes and breads). The occurrence of postcibal nausea, epigastric fullness, abdominal cramps, diarrhea, weakness, palpitation, diaphoresis, and faintness was recorded.

Results

Basal secretions were significantly decreased after operation. No free acid was present in the postoperative secretions of 28 patients. In the 12 patients with free acid, the highest secretion was 0.4 mEq of free acid per hour.

Patients in Group 1 have been followed for three and one-half to five years, and Group 2 for 2-3½ years. No ulcer has recurred.

Group 1 (Without Plyorotomy)

No symptoms of the dumping syndrome occurred. However, seven patients complained of symptoms of gastric stasis. Three of these seven patients had minimal symptoms (epigastric fullness and discomfort) but X-rays showed no signs of stasis. The other four patients had more severe symptoms (dyspepsia, sour eructations, and occasional vomiting) and moderate retention of barium on X-rays. None of these seven patients lost weight. The remaining 13 patients had no signs or symptoms of gastric stasis.

One patient with symptoms and radiologic evidence of stasis requested operative relief two years after his initial operation. At second operation no ulcer was present and no obstruction was found at the anastomosis, pylorus, or proximal duodenum. The antral cuff measured 3 cm. from pylorus to anastomosis. Whether this length was due to technical error in measuring 1.5 cm. at the first operation, or elongation of the antral cuff consequent to stasis, is unknown. Stasis was relieved by completing the antrectomy and establishing gastroduodenostomy. Signs and symptoms in the other patients with gastric stasis have not warranted reoperation.

Group 2 (With Pylorotomy)

No symptoms or radiologic signs of gastric stasis resulted. Minimal symptoms of the dumping syndrome (nausea but no weakness) were elicited repeatedly but not consistently by provocative meals in two patients. The remaining 18 patients had no dumping symptoms.

Discussion

Results in Group 1 raise several questions fundamental to gastric motility. Our previous experiments showed quite clearly that gastric stasis after vagotomy plus suprapyloric antrectomy[3,8] is significantly less than after vagotomy alone and without drainage.[6,12] Also, the distal transection for suprapyloric antrectomy 1.5 cm proximal to the pylorus is apparently a critical level, because transections more proximal to this level result in stasis.[3,8,11] Explanation for these differences is not clear. Personal discussions with Maki and his group, who introduced suprapyloric antrectomy without vagotomy for benign gastric ulcer,[11] brought to light their concept that an important mechanism for stasis after vagotomy without drainage is some type of antiperistalic dysfunction of the so-called antral pump, and removal of this deranged pump by suprapyloric antrectomy eliminates the stasis.[9] However, the stasis found in four of the 20 patients in Group 1 indicates that antral dysfunction is not the only factor. Gastric hypotonicity and outlet obstruction by the intact pylorus must still be considered.

Pylorotomy was evaluated in Group 2 with the rationale of merely decreasing pyloric tonus rather than completely eliminating all tonus and outlet obstruction by conventional pyloroplasty. As previously described, pylorotomy provides a more patulous pylorus that still imparts the sensation of a valve-like ring when palpated from within. Results were successful on two counts. First, the combination of removing motile dysfunction in the antrum by suprapyloric antrectomy plus decreasing pyloric tonus by pylorotomy prevented gastric stasis. Second, and in contrast to total loss of pyloric function by pyloroplasty, partial preservation of the valvular action of the pylorus by pylorotomy prevented significant dumping from the hypotonic stomach. Continued use of pylorotomy in operations subsequent to this study has provided equally satisfactory results to date.

By the criteria of operative mortality and recurrent ulcer, selective vagotomy plus suprapyloric antrectomy

with pylorotomy may be considered to occupy a position in between vagotomy plus pyloroplasty and vagotomy plus complete antrectomy. On the one hand, suprapyloric antrectomy plus pylorotomy shares with pyloroplasty the advantage of avoiding dissection in the area of the duodenal ulcer. On the other hand, suprapyloric antrectomy is a more extensive procedure than pyloroplasty. In regard to recurrent ulcer, the follow-up period of two to five years in this study does not permit long-term appraisal. However, the addition of suprapyloric antrectomy may reasonably be expected to provide more protection against recurrent ulcer than pyloroplasty. The amount of acid in the postoperative secretions in this study is much less than after pyloroplasty.[5] Also, in view of the fact that gastric stasis is a notorious precursor of recurrent ulcer after vagotomy plus pyloroplasty, the results of no recurrences in this study despite the stasis in Group 1 indicate the added protection of suprapyloric antrectomy. These results support our experimental findings that the amount of gastrin released after removing all but 1.5 cm of the distal antrum is significantly less than that released from the entire antrum.[1,3,8] Whether this 1.5 cm of antrum left in the acid stream will prove to be a significant cause of recurrent ulcer remains to be seen.

At the beginning of this study, Eric Amdrup, a previous associate, began evaluation of selective vagotomy of the parietal cell mass without drainage (synonyms: proximal or highly or super selective vagotomy, parietal cell vagotomy). Amdrup's[2] results, and the results of others,[7,10,13] indicate the superiority of this procedure in preserving normal gastric emptying. Also, with the exception of obese patients in whom the dissection may be inaccurate and tedious, parietal cell vagotomy is a procedure of distinctly less magnitude than any other operation. However, the early recurrence of ulcer in some series[10,13] suggests the ulcerogenic potential of the residually innervated antrum, which is contrary to the alleged inhibition by this antrum. It may be concluded that the eventual place of parietal cell vagotomy, and also selective vagotomy plus suprapyloric antrectomy with pylorotomy, is dependent upon longer periods of follow-up observations to evaluate the long-term rate of recurrent ulcer.

Summary and Conclusions

Selective vagotomy plus suprapyloric antrectomy without pylorotomy for duodenal ulcer in 20 patients followed for three and one-half to five years resulted in no recurrent ulcer but an unsatisfactorily high rate of gastric stasis. Complementary pylorotomy in an additional 20 patients followed for 2-3½ years resulted in no recurrent ulcer, no gastric stasis, and minimal dumping symptoms. These results with pylorotomy have encouraged continued use of selective vagotomy plus suprapyloric antrectomy as the operation of choice for controlling the diathesis of duodenal ulcer without producing the dumping syndrome.

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